

CLAIMS

1. A video and/or audio signal processing system comprising a recorder for recording video and/or audio material on a recording medium the recorder including a first generator for generating first material identifiers for identifying respective
5 pieces of material on the medium such that each piece is differentiated from other pieces on the medium, and a second generator for generating second, universally unique, identifiers for pieces of material, second identifiers being generated in respect of one or more of the first identifiers.
- 10 2. A system according to claim 1, wherein the recording medium has an identifier which identifies the medium additionally to the first identifiers which identify material recorded thereon, and the second generator associates the second identifiers with the medium identifier and the first identifiers in combination.
- 15 3. A system according to claim 1 or 2, wherein a third identifier identifying the machine which initially produces the video and/or audio material is produced and the second generator associates the second identifiers with the medium identifier and the first identifiers and the third identifiers in combination.
- 20 4. A system according to claim 1, 2, 3 or 4, wherein the second identifiers are UMIDs.
5. A system according to claim 1, 2, 3, 4 or 5, wherein the first identifiers are recorded on the medium.
- 25 6. A system according to any preceding claim, wherein the first identifiers comprise material reference numbers.
7. A system according to claim 6, wherein the first identifiers are recorded in user
30 bits of time codes.

8. A system according to any one of claims 1 to 7, wherein the medium identifier is recorded on the medium.

5 9. A system according to any one of claims 1 to 8, wherein the medium is contained in a housing .

10 10. A system according to claim 9, having a data store supported by the housing and additional to the medium, and wherein the data store stores at least the medium identifier.

11. A system according to claim 9 wherein at least one first identifier is stored in the said data store.

15 12. A system according to claim 9 or 10 when dependent on claim 3 wherein the third identifier is recorded in the said data store.

13. A system according to any one of claims 9 to 12, wherein the housing has a label on which data may be written.
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14. A system according to any one of claims 2 to 13, wherein the medium identifier is written on the housing.

15. A system according to any preceding claim, further comprising a database
25 processor arranged to associate the second identifiers with at least the first identifiers or with the first identifiers and one or more of the medium identifiers and the third identifiers.

16. A recorder for recording video and/or audio material on a recording medium
30 and including a first generator for generating first material identifiers for identifying respective pieces of material on the medium such that each piece is differentiated

from other pieces on the medium, and a second generator for generating second, universally unique, identifiers for pieces of material, the second generator associating the second identifiers with the first identifiers.

5 17. A recorder according to claim 16 wherein a medium identifier is recorded on the medium.

18. A recorder according to claim 16 or 17, for recording material on a medium contained in a housing which supports a data store additional to the medium, and
10 including a data recording device for recording at least a medium identifier in the data store.

19. A recorder according to claim 17 or 18, wherein the data recording device is arranged to record at least one of the first identifiers in the data store.
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20. A recorder according to claim 19 wherein at least the most recently generated of the first identifiers is recorded in the data store.

21. A recorder according to any one of claims 17 to 20 wherein the recorder is
20 arranged to produce a machine identifier identifying the recorder and to record the machine identifier on the medium and/or in the data store.

22. A recorder according to claim 21 when dependent on claim 18 wherein the recorder is arranged to record the machine identifier in the data store.
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23. A device for reproducing video and/or audio material recorded on a recording medium, the medium having at least first, material, identifiers associated there with and identifying the or each piece of material recorded thereon, the reproducing device having a generator for generating second, universally unique, identifiers for pieces of
30 material, the second generator associating the second identifiers with the first identifiers.

24. A device according to claim 23 wherein the second generator generates a third identifier identifying the device.

5 25. A device according to claim 23 or 24 wherein the device reproduces a medium ID identifying the recording medium from the medium and / or from a data store associated with the medium.

10 26. A device according to claim 23, 24 or 25 wherein the device reproduces the material identifier from the medium and / or from a data store associated with the medium.

15 27. A device according to claim 23, arranged to reproduce material recorded on a medium which is contained in a housing supporting a data store additional to the medium, and to read data from the said data store, the second identifiers being generated in dependence on data in the store.

20 28. A device according to claim 23 or 24, wherein the second identifier generator is arranged to derive UMIDs from one or more of tape ID, machine ID, and MURN

29. A recording medium on which audio and /or video material is recorded, the medium having recorded thereon material identifiers identifying the recorded material, the material identifiers being in user bits of time code recorded on the medium.

25 30. A medium according to claim 29 further comprising a data store supported by a housing which houses the medium, the data store storing at least the last recorded of the first identifiers.

30 31. A video and/or audio signal processing system comprising a recorder for recording video and/or audio material on a recording medium

the recording medium having an identifier which identifies the medium, the recorder including a first generator for generating first material identifiers for identifying respective pieces of material on the medium such that each piece is differentiated from other pieces on the medium.

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32. A video and/or audio signal processing system according to claim 31, and comprising a second generator for generating second, universally unique, identifiers for pieces of material, second identifiers being generated in respect of one or more of the first identifiers.

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33. A method of processing a video and/or audio signal comprising recording video and/or audio material on a recording medium, generating first material identifiers for identifying respective pieces of material on the medium such that each piece is differentiated from other pieces on the medium, and generating second, universally
15 unique, identifiers for pieces of material, the second identifiers being generated in respect of one or more of the first identifiers.

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34. A method of recording video and/or audio material on a recording medium and including generating first material identifiers for identifying respective pieces of material on the medium such that each piece is differentiated from other pieces on the medium, and generating second, universally unique, identifiers for pieces of material, the second generator associating the second identifiers with the first identifiers.

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35. A method of reproducing video and/or audio material recorded on a recording medium, the medium having at least first, material, identifiers associated there with and identifying the or each piece of material recorded thereon, the method comprising generating second, universally unique, identifiers for pieces of material, and associating the second identifiers with the first identifiers.

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36. A computer program product arranged to implement the method of claim 33, 34 or 35 when run on a digital signal processor.

44. A tape medium on which video and/or audio material are recorded on successive slant tracks, storing a slant track video timecode having a plurality of user-definable data bits, and at least one linear track, storing a linear track timecode having a plurality of user-definable data bits, on a tape medium; a material identifying code being recorded in the user-definable bits of the slant track video timecode and in the user-definable bits of the linear track timecode.

45 A digital video tape recording method comprising the steps of:
 10 recording video and/or audio material on successive slant tracks,
 storing a slant track video timecode having a plurality of user-definable data bits, and at least one linear track,
 storing a linear track timecode having a plurality of user-definable data bits, on a tape medium; and
 15 storing a material identifying code in the user-definable bits of the slant track video timecode and in the user-definable bits of the linear track timecode.

46. A recording apparatus which is arranged in operation to record audio and/or video information signals onto a linear recording medium, said apparatus comprising
 20 - a recording drive arranged in operation to record said information signals onto said linear recording medium, and to record metadata associated with said information signals onto said linear recording media with said information signals, wherein said metadata is recorded repeatedly.

25 47. A recording apparatus as claimed in Claim 46, wherein said metadata comprises a plurality of objects, and said recording apparatus comprises
 - a control processor coupled to said recording drive which is arranged in operation to
 - determine a relative importance of the information represented by said
 30 metadata objects, and
 - to configure said recording drive to record said metadata objects a number of

times corresponding to said relative importance of said metadata.

48. A recording apparatus as claimed in Claim 47, wherein said recording drive is arranged in operation to record said information signals on to said linear recording medium at a recording rate, and the number of times said metadata objects are repeated is determined by said control processor from a combination of said relative importance and a reading rate at which said recorded information signals may be read from said linear recording medium.

49. A recording apparatus as claimed in Claim 46, 47 or 48, wherein said number of times said metadata objects are repeated is determined by said control processor from said relative importance and a number of times said reading rate is greater than said recording rate.

50. A recording apparatus as claimed in Claim 46, 47, 48 or 49, wherein said information signals and said metadata are recorded by said recording drive on to said linear recording medium whereby said information signals and said metadata may be separated when read from said linear recording medium.

51. A recording apparatus as claimed in Claim 46, 47, 48, 49 or 50, wherein said control processor is arranged in operation to assign each of said metadata objects to one of a plurality of categories of relative importance, the number of times the metadata objects are repeat recorded being pre-determined for each of said categories.

52. A recording apparatus as claimed in Claim 51, wherein for each of said categories of relative importance the control processor is arranged in operation to

- record the same allocated metadata object in each of a plurality of adjacent cells of said recording medium for said predetermined number of times, and
- record a subsequent metadata object allocated to the same category for said predetermined number of times in a subsequent plurality of adjacent cells.

53. A recording apparatus as claimed in Claim 52, wherein the same metadata object is recorded with reference to a temporal marker recorded with said information signals and said metadata.

5 54. A recording apparatus as claimed in Claim 53, wherein the temporal marker is a time code recorded with said information signals.

55. A recording apparatus as claimed in any of Claims 52 to 54, wherein said plurality of adjacent cells associated with the same category are recorded along a linear
10 axis of the recording medium.

56. A recording apparatus as claimed in any of Claims 47 to 50, wherein the control processor is arranged in operation to

- form metadata packets having a plurality of fields, and
- 15 - control said recording drive to record said metadata packets on to said linear recording medium, whereby said metadata objects are repeated said pre-determined number of times.

57. A recording apparatus as claimed in Claim 56, wherein said control processor
20 further operates to

- allocate the metadata objects to the fields of the packets, whereby the metadata object is repeated in the fields of at least one of said packets.

58. A recording apparatus as claimed in Claim 56, wherein the control processor is
25 arranged in operation to

- allocate a different metadata object to each field of the packet, and
- record repeatedly said metadata packet said determined number of times.

59. A recording apparatus as claimed in any of Claims 56 to 58, wherein the
30 control processor is arranged in operation to

- provide each of said metadata packets with a header field, and

- allocate header information to said header field, which header information is indicative of the metadata objects within the fields of the packet.

60. A recording apparatus as claimed in Claim 59, wherein the control processor is arranged in operation to change the header information between successive packets recorded onto the linear recording medium which have at least one different metadata object.

61. A recording apparatus as claimed in any one of claims 46 to 60, wherein said linear recording medium is a magnetic tape, and the recording drive has

- a rotating head which is configured in operation to record said information signals in helical scan tracks disposed at an angle to a linear axis of said recording tape, and

- a linear recording head which is configured in operation to record said metadata in linear tracks of said magnetic tape at a position adjacent to said helical scan tracks.

62. A recording apparatus as claimed in Claim 61, wherein said metadata is recorded in said linear tracks allocated as user specified bits with said time code.

63. A reproducing apparatus which is arranged in operation to recover audio and/or video information signals recorded with metadata associated with the information signals on to a linear recording medium using a recording apparatus claimed in any preceding Claim, said reproducing apparatus comprising

- reading drive which operates to recover the information signals from the linear recording medium, and the metadata from the linear recording medium, and

- a read control processor which is arranged in operation to determine whether the same metadata has been read by the reading drive from the linear recording medium, to discard the metadata which has been read more than once, and to reproduce said information signals with said metadata.

64. A reproducing apparatus as claimed in Claim 63, when dependent on Claims 6 to 10, wherein the read control processor is configured in operation

- to determine an amount by which the reading rate is greater than the rate at which said information signals were recorded,

5 - to determine which of the categories of relative importance the metadata objects read from said linear receding medium were assigned when recorded,

- to determine the number of times metadata objects in each category have been repeatedly recorded,

10 - to calculate a number of said metadata objects which will be the same metadata object read from said category in dependence upon said amount by which said reading rate is greater than said recorded rate and the pre-determined number of times the metadata objects have been repeatedly recorded in the category, and

- to select one of the metadata objects from the calculated number of metadata objects read with reference to the temporal marker which are the same.

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65. A reproducing apparatus claimed in Claim 64, when dependent upon any one of Claims 56 to 62, wherein the reading drive is arranged in operation to read each of said metadata packets successively from said linear recording medium, and the read control processor is arranged in operation

20 - to recover from the packet header of each packet said header information,

- to determine from said successive packets whether the corresponding header information has changed from one packet to a subsequent packet,

- to determine an amount by which the reading rate is greater than the rate at which said information signals were recorded,

25 - to determine whether more than one packet has the same header,

- to calculate a number of said metadata packets read from said recording medium which will be the same since said header information has changed in dependence upon said determined amount by which said reading rate is greater than said recorded rate, and

30 - to select one of the metadata packets from the calculated number of metadata packets read which are the same.

66. A recording/reproducing apparatus having a recording apparatus as claimed in any of Claims 46 to 62, and a reproducing apparatus as claimed in any of Claims 63 to 65, wherein said recording drive and said reading drive are formed as a recording/reading drive, and said control processor and said reading control processor are formed as a reading/reproducing processor.

67. A video recorder having a recording/reproducing apparatus as claimed in Claim 66.

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68. A method of recording audio and/or video information signals onto a linear recording medium, comprising the steps of

- recording said information signals onto said linear recording medium,
- recording metadata associated with said information signals onto said linear recording medium with said information signals, wherein said metadata is recorded repeatedly.

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69. A method as claimed in Claim 68, wherein said metadata comprises a plurality of objects, and the step of recording said metadata comprises the steps of

- determining a relative importance of the information represented by said data objects, and
- repeating the recording of said data objects a number of times corresponding to said relative importance of said metadata.

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70. A method as claimed in Claim 69, wherein the step of recording said information signals comprises recording said information signals on to said linear recording medium at a recording rate, and the number of times said metadata is repeated is determined in accordance with a combination of said relative importance and a number of times a rate of reading said information signals exceeds the recording rate.

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71. A method as claimed in any of Claims 78 to 70, wherein the step of recording said metadata on to said linear recording medium comprises recording said metadata on to said recording medium whereby said metadata may be separated from said information signals when read from said recording medium.

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72. A method as claimed in any of Claims 68 to 71, wherein each of said metadata objects are assigned to one of a plurality of categories of relative importance, and the step of repeat recording said metadata objects comprises the steps of

10 - allocating each of said metadata objects to one of said categories of relative importance, and

- repeat recording said metadata objects in accordance with the allocated category, the number of times the metadata object is repeat recorded being predetermined for said category.

15 73. A method as claimed in Claim 72, wherein the step of repeat recording said metadata objects in accordance with said allocated categories comprises the steps of

- for each of said categories of relative importance recording the same allocated metadata object in each of a plurality of adjacent cells of said recording medium for said predetermined number of times, and

20 - recording a subsequent metadata object allocated to the same category for said predetermined number of times in a corresponding plurality of adjacent cells.

74. A method as claimed in Claim 73, wherein the same metadata object is recorded with reference to a temporal marker recorded with said information signals and said metadata.

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75. A method as claimed in Claim 74, wherein said temporal marker is a time code recorded with said information signals.

30 76. A method as claimed in either Claim 72 or 75, wherein said plurality of adjacent cells associated with the same category are recorded along a linear axis of the

recording medium.

77. A method as claimed in any of Claims 68 to 76, wherein the step of repeat recording said metadata objects comprises the steps of

- 5 - forming metadata packets having a plurality of fields,
- allocating the metadata objects to the fields of at least one of the packets, whereby the metadata object is repeated in the fields of the at least one packet said determined number of times, and
- recording said at least one metadata packet.

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78. A method as claimed in Claim 77, wherein the step of allocating the metadata objects to the fields of said at least one packet comprises the steps of

- allocating a different metadata object to each field of the packet, and
- the step of recording the at least one metadata packet comprises the step of
- 15 - recording repeatedly said metadata packet said determined number of times.

79. A method as claimed in Claims 77 or 78, wherein the step of forming said metadata packet comprises the steps of

- providing each of said metadata packets with a header field, and
- 20 - allocating header information to said header field, which header information is indicative of the metadata objects within the fields of the packet.

80. A method as claimed in Claim 79, wherein the header information changes between successive packets recorded onto the linear recording medium which have
25 different metadata objects.

81. A method as claimed in any one of claims 46 to 80, wherein said linear recording medium is a magnetic tape, and the step of recording said information signals comprises the steps of

- 30 - recording said information signals using a rotating head whereby said information signals are recorded in helical scan tracks disposed at an angle to a linear

axis of said recording tape, and the step of recording said metadata comprises the step of

- recording the metadata using a linear recording head along said linear tracks of said magnetic tape at a position adjacent to said helical scan tracks.

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82. A method as claimed in Claim 81, wherein said position adjacent to said linear tracks is the position allocated to said user specified bits and with said time code.

83. A method of reproducing information signals recorded with metadata associated with the information signals on to a linear recording medium using the method of recording claimed in any of Claims 68 to 82, comprising the steps of

- reading the information signals from the linear recording medium,
- reading the metadata from the linear recording medium,
- determining whether the same metadata has been read from the linear recording medium during the step of reading the metadata,
- discarding the metadata which has been read more than once, and
- reproducing said information signals with said metadata.

84. A method of reproducing as claimed in Claim 83, when dependent on Claims 27 to 31, wherein the step of reading the metadata comprises the steps of

- determining an amount by which the reading rate is greater than the rate at which said information signals were recorded,
- determining which of the categories of relative importance the metadata objects read from said linear recording medium were assigned when recorded,
- determining the number of times metadata objects in the category has been repeatedly recorded,
- calculating a number of said metadata objects which will be the same metadata object read from said category after the temporal marker in dependence upon said determined amount by which said reading speed is greater than said recorded rate and the pre-determined number of times the metadata objects have been repeatedly recorded in the category, and the step of selecting and discarding the metadata

comprises

- selecting one of the metadata objects from the calculated number of metadata objects read which are the same.

5 85. A method of reproducing information signals as claimed in Claim 83, when dependent upon Claims 77 to 82, wherein the step of reading the metadata comprises the steps of

- reading each of said metadata packets successively from said linear recording medium, and

10 - recovering from the packet header of each packet said header information, and
 - determining from said successive packets whether the corresponding header information has changed from one packet to a subsequent packet, and the step of determining whether the same metadata object has been read more than once from the recording medium comprises,

15 - determining an amount by which the reading rate is greater than the rate at which said information signals were recorded,

- determining whether more than one packet has the same header,

- calculating a number of said metadata packets read from said recording medium which will be the same since said header information has changed in
 20 dependence upon said determined amount by which said reading speed is greater than said recorded rate, and the step of discarding the metadata comprises

- selecting one of the metadata packets from the calculated number of metadata packets read which are the same.

25 86. A computer program providing computer executable instructions, which when loaded onto a computer configures the computer to operate as a recording apparatus as claimed in any of Claims 46 to 65.

87. A computer program providing computer executable instructions, which when
 30 loaded on to a computer causes the computer to perform the method according to Claims 68 to 85.

88. A computer program product having a computer readable medium recorded thereon information signals representative of the computer program claimed in Claim 8 86 or 87.

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89. A recording apparatus as herein before described with reference to Figures 32 to 41 of the accompanying drawings.

90. A reproducing apparatus as herein before described with reference to Figures 32 to 41 of the accompanying drawings.

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91. A method of recording audio and/or video information signals as herein before described with reference to Figures 32 to 41 of the accompanying drawings.

92. A method of reproducing audio and/or video information signals as herein before described with reference to Figures 32 to 41 of the accompanying drawings.

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93. A digital video tape recorder substantially as hereinbefore described with reference to the Figures 28, 29 and 31 of the accompanying drawings.

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94. A tape format substantially as hereinbefore described with reference to Figures 28, 29 and 31 of the accompanying drawings.

95. A tape medium substantially as hereinbefore described with reference to Figures 28, 29 and 31 of the accompanying drawings.

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96. A digital video tape recording method substantially as hereinbefore described with reference to Figures 28, 29 and 31 of the accompanying drawings.

97. A material processing system substantially as hereinbefore described with reference to Figures 1 to 30 of the accompanying drawings.

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99. A reproducing apparatus as herein before described with reference to Figures 1 to 30 of the accompanying drawings.

10 101. A recording medium substantially as hereinbefore described with reference to
Figures 1 to 30 of the accompanying drawings.

37. A storage medium storing a computer program product according to claim 36.

38 A digital video tape recorder operable to record video and/or audio material on successive slant tracks, storing a slant track video timecode having a plurality of user-
5 definable data bits, and at least one linear track, storing a linear track timecode having a plurality of user-definable data bits, on a tape medium;

the digital video tape recorder being operable to store a material identifying code in the user-definable bits of the slant track video timecode and in the user-definable bits of the linear track timecode.

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39. A recorder according to claim 38, in which the slant track time code is a vertical interval time code (VITC).

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40. A recorder according to claim 38 or claim 39, in which the material identifying code is larger than the user data bits available in a single timecode, so that each instance of the material identifying code is recorded across the user bits of time codes relating to more than one field of the video material.

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41. A recorder according to claim 38, 39 or 40, in which the material identifying code is a code which uniquely defines the material amongst other material items stored on the same medium.

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42. A video recorder according to claim 41, in which the material identifying code is an SMPTE UMID.

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43. A tape format in which video and/or audio material are recorded on successive slant tracks, storing a slant track video timecode having a plurality of user-definable data bits, and at least one linear track, storing a linear track timecode having a plurality of user-definable data bits, on a tape medium; a material identifying code being
recorded in the user-definable bits of the slant track video timecode and in the user-definable bits of the linear track timecode.